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Impact of spinal dysraphism on urinary and faecal prognosis in 25 cases of cloacal malformation

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Abstract *Objective:* Urinary and faecal continence are key challenges goal of cloacal malformation management. Most well-known prognostic factors are the length of common channel (CC) and the presence of a sacral defect, but the impact of associated spinal dysraphism is less well documented. The aim of this study was to investigate the impact of different types of dysraphism on urinary and faecal continence in this patient population.
Materials and methods: From 1991 to 2011, charts and office notes of 25 patients with cloacal malformation were retrospectively reviewed. At last clinic visit, urinary and faecal continence status according to Krickenbeck criteria were correlated with the length of CC, the presence of a sacral defect (sacral ratio), and the presence of different types of spinal cord dysraphism using magnetic resonance imaging (MRI) and Fisher's exact test.
Results: Mean follow-up was 8 years (4 months—21 years). The sacral ratio was abnormal (below 0.74) in 18 cases out of 25 (72%). MRI review showed normal spinal cord in eight out of 23 cases (Group 1), spinal cord anomaly in 15 out of 23 cases (65%) including nine cases of tethered cord complex (Group 2) and six cases of a short spinal cord (Group 3). While statistical analysis showed a difference regarding urinary prognosis between the groups ($p = 0.005$), no significant difference was found regarding faecal prognosis. None of the six

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patients with short spinal cord were continent for both urinary and faecal prognosis.
Conclusions: This is the first study, which highlights the impact of different types of spinal dysraphism on functional outcome in patients with cloaca. Short spinal cord seemed to carry the worst prognosis. A prospective study with a larger series is mandatory to confirm these preliminary results.

Introduction

Cloacal malformation is a rare and complex form of anorectal malformation (ARM) in girls. Hendren [1] has previously detailed the clinical characteristics of various anatomic forms. Over the past two decades, Pena and colleagues [2—4] have contributed significantly to improve the management of this malformation.

Focussing on urinary and faecal continence, the length of the common channel (CC) appeared as the main prognosis factor. Seventy-two per cent void spontaneously and 66% had voluntary bowel movement when the CC was shorter than 3 cm, and 22% and 36%, respectively, when CC is longer than 3 cm [2].

Associated malformations are frequent in cloaca and their incidence is conversely correlated with the length of the CC [2]. Duplication of the Müllerian ducts and urological defects are the most common associated malformations [5]. Incidence of sacral defects and spinal dysraphism are well documented: Hendren [1] mentioned an incidence of 34% of spinal cord anomalies and Kim et al. [6] 60% in their series of 105 ARM with 15 cloacae respectively. However, there is very little information concerning the type of spinal cord anomaly.

Most authors dealing with cloaca repair point out that sacral anomaly and/or spinal dysraphism has an impact on urinary and faecal continence prognosis. The increasing accuracy of magnetic resonance imaging and understanding of spinal anomalies led us to reconsider the impact of the different types of spinal dysraphism on faecal and urinary prognosis in 25 cases of cloacal malformation.

Patients and methods

From 1991 to 2011, 25 patients with cloacal malformation were managed in our institution. Clinical information concerning prenatal diagnosis, associated malformations, age at surgery, length of CC, surgical procedure, postoperative course, and follow-up were retrospectively collected from a chart review.

Functional evaluation

Patients under 3 years of age and/or with colostomy were excluded.

Patients completely dry with no leakage and able to void spontaneously were included in the normal bladder function group. Patients requiring intermittent catheterization (IC) and incontinent patients were included in the bladder dysfunction group.

According to the Krickenbeck criteria [7], patients with voluntary bowel movements, feeling of urge, and capacity to hold the bowel movement without soiling were included in the faecal continent group. Patients with no voluntary bowel movements, episodes of soiling, and those who had undergone a Malone procedure were included in the faecal incontinent group.

Sacral and spinal cord evaluation

Sacral morphology was evaluated using the anterior—posterior sacral ratio (SR) on an anterior—posterior film [8] (normal value > 0.74). This assessment was performed retrospectively by two independent surgeons (C.C. and C.M.) who were blinded to the outcome of the patients.

Spinal cord morphology was evaluated on magnetic resonance imaging (MRI). All MR images were reviewed by

Table 1 Patient's characteristics.

Total number of patients	$n = 25$
Prenatal diagnosis	$n = 7$[a]
Median term (WG) and weight (g) at birth (min—max)	37 (32—41)//2772 (1670—3700)
Associated malformations	
Dysraphism	$n = 15$
Sacral defect	$n = 16$
Vertebral malformation	$n = 5$
Cardiopathy	$n = 4$
Renal malformation	$n = 3$
Oesophageal atresia	$n = 1$
Median age at reconstructive surgery (min—max)	7 months (22 days-10 years)
Length of common channel	
<3 cm	$n = 17$
>3 cm	$n = 8$
Reconstructive Surgery	
PSARP	$n = 16$
PSARP + TUM	$n = 2$
PSARP + laparotomy	$n = 5$
Not documented	$n = 2$

PSARP = posterior sagittal anorectoplasty.
WG = week of gestation.
TUM = total urogenital mobilization.
[a] 4 cases of hydrocolpos, 2 misdiagnosis of ovarian cyst, 1 case of hydramnios.